MERRIMACK RIVER BASIN

WILTON, NEW HAMPSHIRE

ABBOTT MEMORIAL TRUST DAM

N H 00260

NHWRB 254.05

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS. 02154

APRIL 1979

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NH 00260	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Abbott Memorial Trust Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE April 1979 13. NUMBER OF PAGES 36
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Merrimack River Basin
Wilton, New Hampshire
Stony Brook, Tributary of Souhegan River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

THe dam is an 81 ft. long concrete and stone masonry gravity dam. The spillway is about 60 ft. long and is founded on bedrock. The dam is small in size with a low hazard classification. The dam is in fair condition at the present time and requires some routine maintenance.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED

JUN 0 3 1979

Honorable Hugh J. Gallen
Governor of the State of New Hampshire
State House
Concord, New Hampshire 03301

Dear Governor Gallen:

I am forwarding to you a copy of the Abbott Memorial Trust Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Water Resources Board, the cooperating agency for the State of New Hampshire. In addition, a copy of the report has also been furnished the owner, Abbott Machine Company, Wilton, New Hampshire 03086.

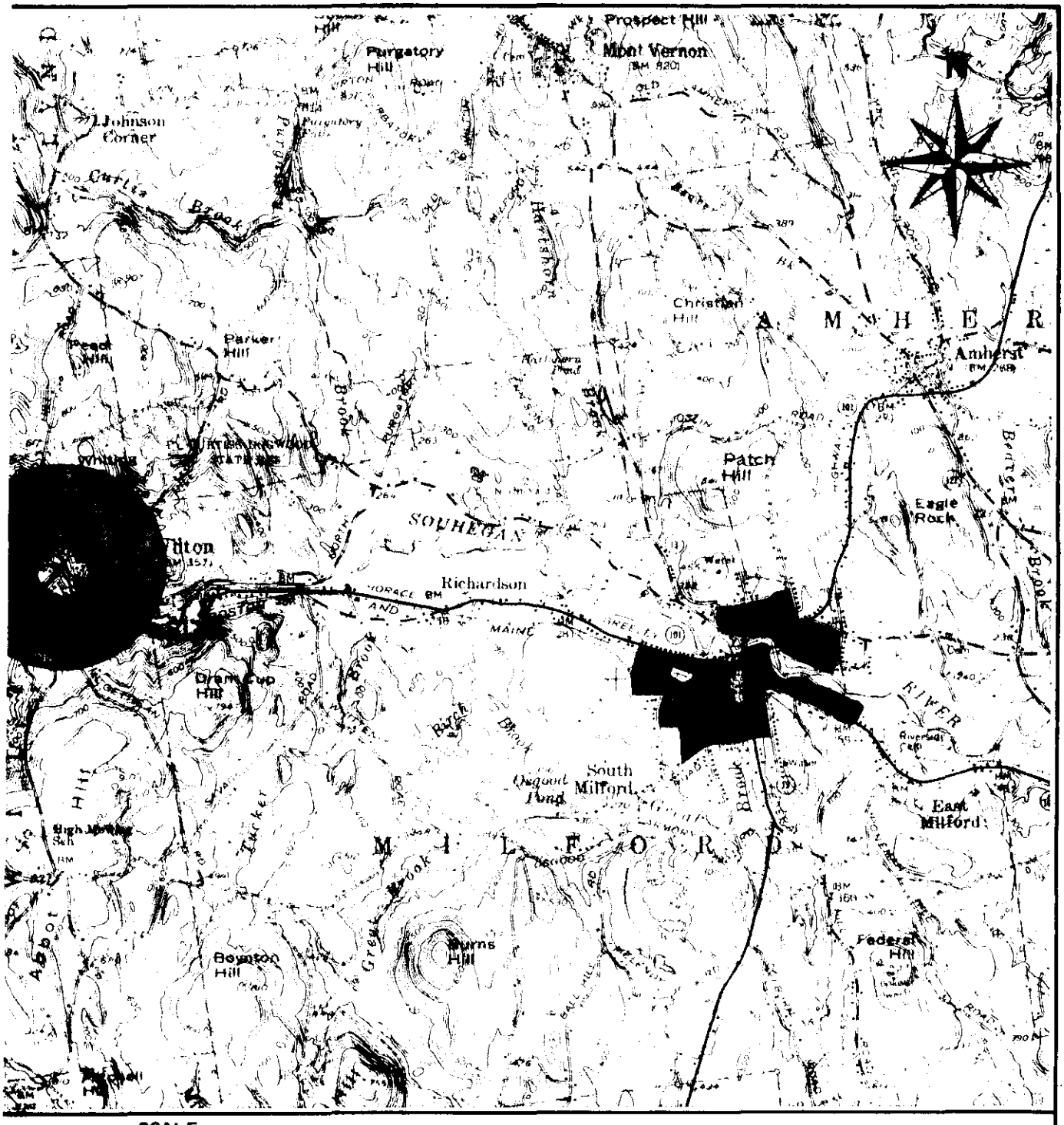
Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Water Resources Board for your cooperation in carrying out this program.

Sincerely yours,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated



— SCALE —

0 1/2 1 2 MILES

FROM: USGS MILFORD, N.H.
QUADRANGLE MAP

GOLDBERG, ZOINO, DUNNICLIFF & ASSOC., INC.
GEOTECHNICAL CONSULTANTS
NEWTON UPPER FALLS, MASS.

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCUS PLAN

FILE No. 22101

ABBOTT MEMORIAL TRUST DAM — NEW HAMPSHIRE

SCALE AS NOTED

DATE JANUARY 1979

NATIONAL DAM INSPECTION PROGRAM

PHASE I REPORT

Identification No.:	NH 00260
NHWRB No.:	254.05
Name of Dam:	ABBOTT MEMORIAL TRUST DAM
Town:	Wilton
County and State:	Hillsborough County, New Hampshire
Stream:	Stony Brook, Tributary of Souhegan River
Date of Inspection:	November 1, 1978

BRIEF ASSESSMENT

Abbott Memorial Trust Dam is an 81 foot long concrete and stone masonry gravity dam. The spillway is approximately 60 feet long and is founded on bedrock. There are no operating outlets at the dam although there was previously an intake to a mill building on the right bank and a 3.3 foot by 4 foot opening in the spillway which had a sluice gate control. The dam is owned by the Abbott Machine Company and some type of dam has existed at the site since 1837. The present dam was built in 1906.

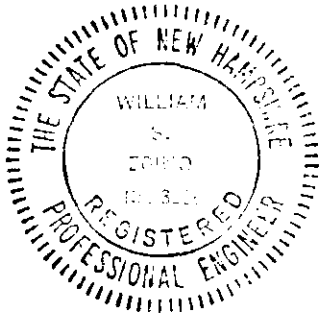
The dam lies on Stony Brook which is a tributary to the Souhegan River. The drainage area is 33 square miles and is forested with steep slopes and narrow drainage channels. The dam's maximum impoundment of 75 acre-feet and height of 23 feet place the dam in the SMALL size category. A dam failure would cause little threat of loss of life and small amounts of property damage resulting in a LOW hazard potential classification.

Based on the size and hazard classification and in accordance with the Corps' guidelines, the Test Flood (TF) is taken as the 100 year flood. This yields a flow at the dam of 5,700 cfs. This flow results in a water level of 9.8 feet above the spillway crest which is 0.2 feet below the ground level at the left abutment which is the lowest point of the non overflow portion of the dam. The spillway capacity with water at the top of the dam is 5880 cfs.

The dam is in FAIR condition at the present time and requires some routine maintenance. The owner should retain the services of a registered professional engineer to monitor the seepage at the left downstream training wall to determine the necessity to design seals or rehabilitate the abandoned intake and sluice gate structures, and to determine the method of draining the impoundment pool to permit remedial measures to be accomplished. Recommended remedial measures include draining the impoundment pool to repair the stone masonry, repairing all voids at the

base of the spillway, repairing all deteriorated concrete, repairing the pipe rail fences, and instituting a program of annual technical inspections.

The recommendations and improvements outlined above should be implemented within one year of receipt of this report by the owner.



William S. Zoino
N.H. Registration 3226

Nicholas A. Campagna, Jr.
California Registration 21006

This Phase I Inspection Report on Abbott Memorial Trust Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Joseph A. McElroy

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Joseph W. Finegan, Jr.

JOSEPH W. FINEGAN, JR., CHAIRMAN
Chief, Reservoir Control Center
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the Test Flood should not be interpreted as necessarily posing a highly inadequate condition. The Test Flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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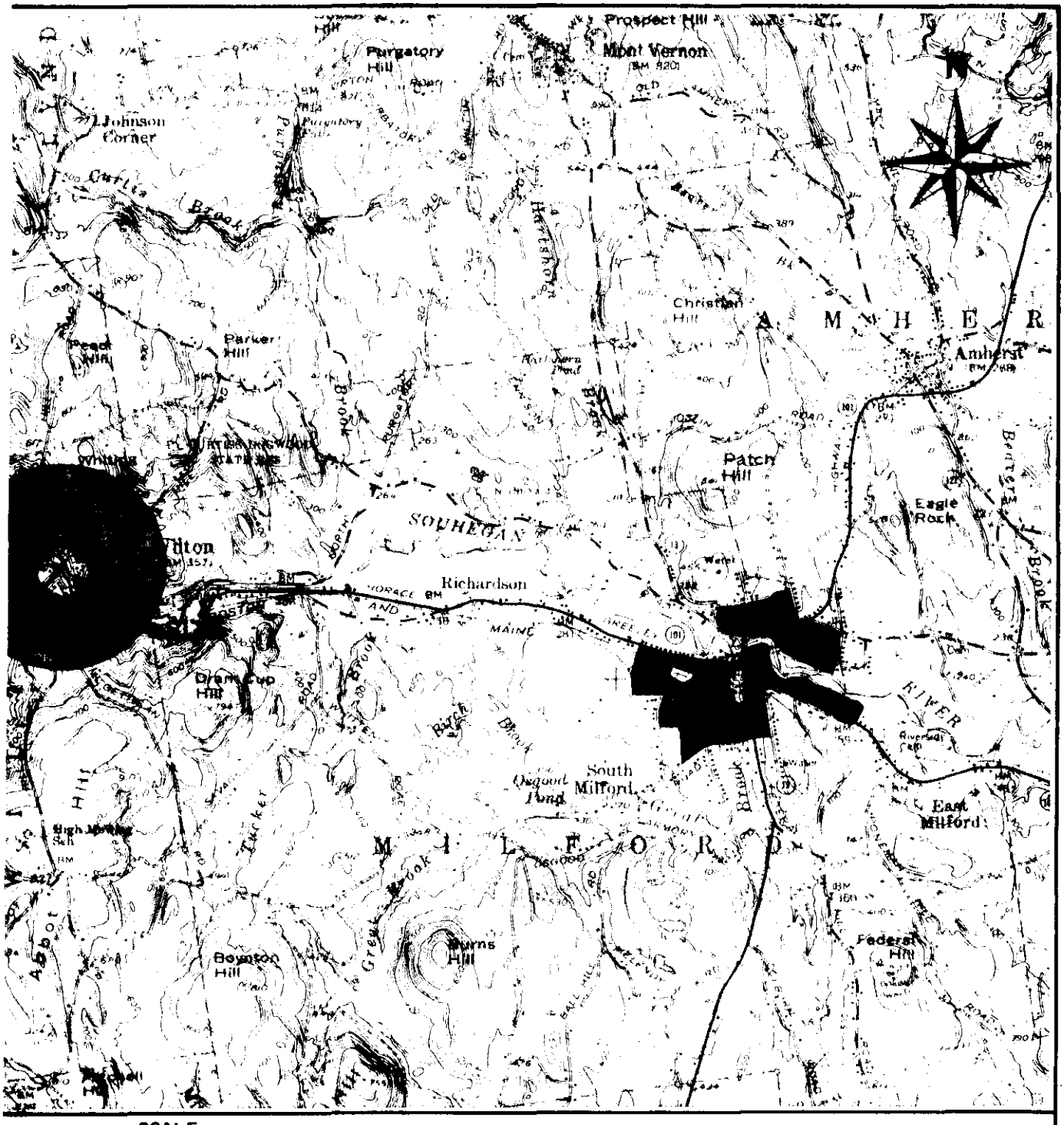
Overview from downstream channel showing opening under road bridge



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NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCUS PLAN

FILE No. 22101

ABBOTT MEMORIAL TRUST DAM — NEW HAMPSHIRE

SCALE AS NOTED

DATE JANUARY 1979

PHASE I INSPECTION REPORT

ABBOTT MEMORIAL TRUST DAM

SECTION 1

PROJECT INFORMATION

1.1 General

(a) Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Goldberg, Zoino, Dunnicliff & Associates, Inc. (GZD) has been retained by the New England Division to inspect and report on selected dams in the State of New Hampshire. Authorization and notice to proceed was issued to GZD under a letter of November 28, 1978 from Colonel Max B. Scheider, Corps of Engineers. Contract No. DACW 33-78-C-0013 has been assigned by the Corps of Engineers for this work.

(b) Purpose

(1) Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.

(2) Encourage and prepare the states to initiate quickly effective dam safety programs for non-federal dams.

(3) Update, verify, and complete the National Inventory of Dams.

(c) Scope

The program provides for the inspection of non-federal dams in the high hazard potential category based upon location of the dams and those dams in the significant hazard potential category believed to represent an immediate danger based on the condition of the dam.

1.2 Description of Project

(a) Location

The Abbott Memorial Trust Dam lies on Stony Brook in the town of Wilton, New Hampshire. The dam is located approximately 50 feet upstream from the bridge carrying N.H. Route 31 over Stony Brook in Wilton, N.H. The dam is located approximately 200 feet upstream from the confluence of Stony Brook and the Souhegan River. The portion of USGS Milford, N.H. quadrangle presented previously shows this locus. Figure 1 of Appendix B is a site plan developed from the map and the site visit.

(b) Description of Dam and Appurtenances

The dam consists of a concrete faced, stone masonry, gravity spillway; upstream and downstream cemented stone masonry walls on the left bank; and five splayed, cemented stone masonry walls capped with concrete on the right bank. A stone arch tailrace outlet is located on the right downstream spandrel wall of the arch bridge located just downstream of the spillway. This tailrace had its origin at the right wall, upstream of and approximately parallel to the spillway axis.

The dam shown on the overview photos (P. vii) is approximately 81 feet long of which the spillway is approximately 60 feet long. The left end wall of the dam is about 11.5 feet above the spillway crest. The right end of the dam is approximately 12.9 feet above spillway crest elevation. This includes a 7.7 foot concrete extension. The lowest point at which flow can bypass the dam is 10 feet above the spillway crest. This low area is located on the left side upstream of the end wall. The dam is founded on bedrock.

1) Left Training Walls

These structures are constructed with cemented stone masonry with a cemented squared stone masonry capstone approximately 18 inches wide. The total length of these walls is approximately 125 feet and are aligned approximately as shown on Figure 2 of Appendix B.

2) Spillway

This is a stone masonry gravity structure faced and capped with concrete. The spillway is about 60 feet long. The maximum height of the spillway is 10.5 feet at the 3.3 foot by 4 foot

tunnel opening. The spillway is as little as 5 feet high at the left end. The crest is about 2 feet wide and the downstream face has a batter of 1 horizontal to 6 vertical.

There are seven rectangular openings (overview photo and photo 6) on the downstream face. The opening on the right side is 3.3 feet wide by 4 feet high and houses an abandoned sluice gate. The other openings are pressure relief vents and are 2 feet square.

3) Right End Walls and Training Walls

These structures consist of dry and cemented stone masonry with a concrete wall addition that is 7.7 feet high. The downstream masonry walls are cemented while the upstream walls are dry. The tops of the concrete walls are approximately 2 feet wide and support a pipe rail fence. The overall length of these walls is about 118 feet. The walls are laid out approximately as shown on Figure 2 of Appendix B.

4) Intake Structure and Tailrace

The intake structure is located in the right end wall between the right end of the spillway and the right upstream training wall. The intake structure is about 10 feet wide and extends upstream approximately 4 feet. The inlet is about 3 feet wide with a rectangular shape. The height could not be determined. The outlet extends through a secondary arch of the right downstream spandrel wall of the bridge. The overall height of the outlet is 6.5 feet to the crown and 8 feet wide. The height from the spring line to the crown is 3 feet.

(c) Size Classification

The dam's maximum impoundment of 75 acre-feet and height of 23 feet place the dam in the SMALL size category according to the Corps' of Engineers recommended guidelines.

(d) Hazard Potential Classification

The hazard potential classification for the dam is LOW. In the event of a dam failure, the outflow will not affect structures downstream unless the Souhegan River is concurrently at flood stage. At high stages the failure flow will add no more than a 0.5 foot flood increment to the flood level.

(e) Ownership

The dam is owned by the Abbott Machine Company of Wilton, N.H. Mr. Derek Smith is responsible for the dam and can be reached by telephone at 603-654-2341.

(f) Operator

No operation of the dam is performed.

(g) Purpose of Dam

The dam was originally used to supply power for a mill building previously located on the right side of the dam.

(h) Design and Construction History

A dam was originally built at the site in 1837. In 1906 the present dam was constructed at the site.

(i) Normal Operational Procedure

No operation of the dam is performed.

1.3 Pertinent Data

(a) Drainage Area

The Abbott Memorial Trust Dam receives runoff from a 33 square mile area. The watershed is predominantly forested and hilly with steep slopes and narrow drainage channels. There are a few ponds, reservoirs, and swampy areas upstream. In particular, the Soil Conservation Service (SCS) has constructed four flood control dams in this watershed, which are designed to reduce flood peaks. These four dams control a drainage area of approximately 12.5 square miles.

(b) Discharge at Damsite

(1) There are no operating outlet works at the dam. The 3.3 foot by 4 foot opening houses a sluice gate, but the gate is no longer used or operable. The intake structure to the former mill building is also not operable.

(2) The maximum recorded flood depth occurred on September 21, 1938 and was 8 feet above the spillway crest with a flow of approximately 4200 cfs. Since 1938 four SCS flood control dams have been constructed which should reduce the peak flood flows.

(3) The ungated spillway capacity with water level at the top of dam elevation 358.9 is 5880 cfs.

(4) The ungated spillway capacity at Test Flood elevation 357.7 is 5700 cfs.

(5) Gated spillway capacity at normal pond elevation - Not applicable

(6) Gated spillway capacity at Test Flood elevation - Not applicable

(7) Total spillway capacity at Test Flood elevation - Same as (4) above

(8) Total project discharge at Test Flood elevation - Same as (4) above

(c) Elevation (ft. above MSL)

(1) Streambed at centerline of Dam: 339 ±

(2) Maximum tailwater: Unknown

(3) Upstream portal invert diversion tunnel: NA

(4) Recreation pool: NA

(5) Full flood control pool: NA

(6) Spillway crest (gated): NA

(7) Design surcharge (original design): Unknown

(8) Top Dam: 358.9 (ground surface left of dam)

(9) Test flood design surcharge: 357.7

(d) Reservoir

(1) Length of maximum pool: 1500 ft. ±

(2) Length of normal pool: 700 ft. ±

(3) Length of flood control pool: NA

(e) Storage (acre-feet)

(1) Recreation pool: NA

(2) Flood control pool: NA

(3) Spillway crest pool: 25 ±

(4) Top of dam: 75 ±

(5) Test flood pool: 70 ±

(f) Reservoir Surface (acres)

(1) Recreation pool: NA

(2) Flood-control pool: NA

(3) Spillway crest: 5 ±

(4) Test flood pool: 7 ±

(5) Top dam: 7.5 ±

(g) Dam

(1) Type: Stone masonry and concrete gravity

(2) Length: 81 ft.

(3) Height: 23 ft.

(4) Top width: 2 ft.

(5) Side slopes: Vertical

(6) Zoning: NA

(7) Impervious Core: NA

(8) Cutoff: None

(9) Grout curtain: Unknown

(10) Other:

(h) Diversion and Regulating Tunnel

NA

(i) Spillway

(1) Type: Stone masonry with concrete cap and facing

(2) Length of weir: 60 ft.

(3) Crest elevation: 348.9

(4) Gates: 3.3 ft. wide by 4 ft. high (not operable)

(5) U/S channel: Width of stream

(6) D/S channel: Width of stream

(7) General:

(j) Regulating Outlets

There are no operable regulating outlets. The intake at the right side has been filled with boulders and rubble. The 3.3 by 4 ft. sluice gate in the spillway is closed and has no operating mechanism. The invert elevation of the gate is approximately 343.

SECTION 2 - ENGINEERING DATA

2.1 Design Records

The design of the dam is quite simple and incorporates no unusual features. No design records are available for the dam.

2.2 Construction Records

No construction records are available for the dam.

2.3 Operational Records

No operational records are available except for the observation that the 1938 flood depth at the dam was approximately 8 feet above the spillway crest.

2.4 Evaluation of Data

(a) Availability

The lack of design and construction data warrants an unsatisfactory assessment for availability.

(b) Adequacy

The lack of in-depth engineering data does not permit a definitive review. Therefore, the adequacy of the dam cannot be assessed from the standpoint of reviewing the design and construction data. This assessment is thus based primarily on the visual inspection, past performance, and sound engineering judgment.

(c) Validity

Since the observations of the inspection team generally confirm the information contained in the records of the New Hampshire Water Resources Board, a satisfactory evaluation for validity is indicated.

SECTION 3 - VISUAL OBSERVATIONS

3.1 Findings

(a) General

The Abbott Memorial Trust Dam is in FAIR condition at the present time.

(b) Dam

(1) Left Training Walls (See Fig. 2 of Appendix B)

The stone masonry at the base of the downstream training wall has ravelled. The ravelling is located immediately downstream of the spillway, and a void approximately 5 feet long, 2 feet high, and 18 inches deep has resulted. Chinking stones have been displaced at the base of the wall for an additional 10 feet. The unravelling and displacements are attributed to scouring and ice damage. The joints of the lower 2 feet of the wall are completely void of mortar.

Seepage (Photo 2) of approximately 15 to 30 gpm was flowing through the interface of the stone and the rock foundation. Steel shear pins have been driven immediately downstream of the spillway to resist lateral movement of the base of the wall. Supplementary stone masonry was set in mortar in the vicinity of the downstream angle point in the wall. This masonry was placed in front of the original wall for approximately 15 feet. A prior failure had occurred at this location. Seepage at the rate of 2 to 4 gpm was flowing through a vertical joint between the downstream end of this wall and the bridge spandrel wall. The outlet for the seepage is approximately 1 foot below spillway crest elevation. Minor joint erosion was observed along the wall.

The upstream training wall (Photo 1) extending to the splayed portion of the wall has eroded joints to a height of 5 feet above its base and running for the length of the wall. The erosion is attributed to scouring and ice damage. A former opening, which has been sealed with cemented stone masonry, is located at the base of the wall approximately 22 feet upstream of the spillway. Approximately 10 feet further upstream another opening has been sealed with cemented stone masonry. There is

considerable vegetation including a 3 inch sapling flourishing on the face of this wall.

The upstream splayed wall and its extension are in good condition with no evidence of displaced stones, bulging, or other signs of distress. The left bank is unpaved.

(2) Spillway

The top of the spillway (Photos 5 and 6) is capped with granolithic concrete. The cap is spalled over 50% of its surface area, and the spalling is up to 4 inches deep. Three full length construction joints on the upstream face have opened over the entire length of the spillway. The surface spalling and joint erosion is attributed to ice damage. Seepage was observed at the interface with both training walls.

Surface erosion (Photo 6) has occurred at the downstream base adjacent to and between tunnel openings. Erosion on the right side of the right tunnel opening is approximately 12 inches high, 2.5 feet long, and 12 inches deep. Erosion has occurred under a boulder adjacent to this tunnel opening. Erosion between the second and third tunnel is approximately 3 feet long, 3 inches high, and 4 inches deep. Minor erosion has occurred between the third and fourth tunnels. Additional erosion has occurred at the base of the spillway adjacent to the left training wall. One section is 8 inches square and 8 inches deep while the second is 10 feet long, 8 inches high, and 3 inches deep. The erosion at the base is attributed to cavitation and ice damage.

The 3.3 foot by 4 foot opening (Photo 6) is an outlet for a tunnel with an inclined metal sluice gate. The gate is set at a 1 horizontal to 1 vertical slope and is located approximately 15 feet upstream of the downstream spillway face. No operating equipment was observed. Seepage was observed flowing through the tunnel at a rate of 10 to 20 gpm. The remaining six square openings are pressure relief vents 15 inches deep and terminate at the face of the original stone masonry dam. Minor seepage was observed at these openings. Reinforcing steel is exposed and rusted at the tops of all seven openings.

(3) Right End Wall and Training Walls

The downstream training wall (overview photo) is constructed of cemented stone masonry with a concrete cap approximately 7.7 feet high on top of the wall. The base of the cap is founded on a bench approximately 5.2 feet above spillway crest level. The wall is in good condition with no evidence of displaced stones, bulges, or other signs of distress. Vegetation is growing on the bench at the base of the concrete wall. The concrete wall is in good condition with no evidence of spalls, cracks, or efflorescence. The 2 pipe rail fence is approximately 1.3 feet high. It has been vandalized, and post and rail sections are missing. The low masonry wall at this location is in good condition with the exception of minor joint erosion.

The right end wall extends from the spillway for a distance of about 21 feet. The original wall was of concrete and extended about 2 feet above the spillway crest. Two courses of stone masonry, approximately 3 feet high, have been placed above this concrete. A concrete extension that is 7.7 feet high has been placed on the stone masonry. The original concrete wall at the end of the spillway is eroded up to 2 inches deep from the spillway crest level to 3 feet below the spillway crest. The erosion is attributed to ice damage. The cemented stone masonry is in good condition with no loss of joint mortar, evidence of displacement, bulging, or other signs of distress. The upper concrete wall is in good condition with no evidence of spalls, cracks, or efflorescence. The pipe rail fence is in good condition at this location.

The upstream training wall and return wall (Photo 3) are constructed of dry stone masonry capped with a concrete wall of variable height. The top of the concrete wall is approximately 3 feet lower than the concrete walls at the end wall and downstream training walls. The stone masonry wall is in good condition with no evidence of spalls, cracks, or efflorescence. The upstream end of the pipe rail fence has missing rails.

The stone steps located between the return wall and the channel slope paving consist of 10 risers of 1 foot height. These steps are in good

condition with no evidence of subsidence or displacement. The dry slope paving has been laid at approximately a 2 horizontal to 1 vertical slope and is in good condition with no evidence of subsidence or displacement.

(4) Intake Structure and Tailrace

This structure (Photo 4) is probably a concrete-faced and capped structure which was included in the original dam construction. There was no sign of any operating equipment or sluice gate at the time of the inspection. The top of the structure is approximately 5 feet above crest level. The tailrace was partially demolished upstream of the roadway and rubble fill sealed the opening in the tunnel. At the time of inspection, seepage at the rate of 0.1 gpm or less was observed flowing at the tailrace outlet.

3.2 Evaluation

The Abbott Memorial Trust Dam is in FAIR condition at the present time. Some maintenance type repairs need to be performed to allow the continued use of the dam. In particular, repair of deteriorated concrete and stone masonry walls needs to be done.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Operational Procedures

No operation is performed at the dam.

4.2 Maintenance of Dam

No maintenance program exists for the dam.

4.3 Maintenance of Operating Facilities

There are no operating facilities at the dam.

4.4 Description of Warning System

There is no formal warning system for the dam.

4.5 Evaluation

The dam's present FAIR condition is a direct result of the lack of a maintenance program for the dam. Repair of deteriorated concrete needs to be performed.

SECTION 5 - HYDRAULICS/HYDROLOGY

5.1 Evaluation of Features

(a) General

The dam is a stone masonry and concrete gravity dam with a total length of about 81 feet and a height of 23 feet. The dam is a run-of-the-river structure with a small retention pool. The drainage area is 33 square miles of hilly and forested terrain.

(b) Design Data

Data sources available for Abbott Memorial Trust Dam include prior inventory and inspection reports. The New Hampshire Water Control Commission's "Data on Dams in New Hampshire" (September 26, 1939) and "Data on Water Power Developments in New Hampshire" (September 26, 1939); the New Hampshire Water Resources Board's "Inventory of Dams and Water Power Developments" (August 26, 1936) and "Survey of Existing New Hampshire Dams" (August 10, 1937); and the Public Service Commission's of New Hampshire "Dam Record" (September 3, 1936) provide much of the basic data for the dam. Inspection reports from June 6, 1940; July 11, 1951; and July 25, 1975 are also available.

Anderson Nichols Company (ANCO) provided copies of data, computations, and drawings performed for a Flood Insurance Study (FIS) which included Stony Brook, the Souhegan River, and Abbott Memorial Trust Dam. These included cross-section data and 10, 50, 100, and 500-year peak discharge at the dam as well as a topographic map and water surface profiles of Stony Brook and the Souhegan River as they pass through Wilton.

(c) Experience Data

A Water Control Commission questionnaire completed by the dam's owners concerning flood levels experienced during September 21 through 24, 1938 is available. The reported peak level was about 8 feet above the spillway crest.

(d) Visual Observations

At the left abutment a stone masonry retaining wall rises 11.5 feet above the spillway crest. Behind the wall there is a small park and roadway extending some 58 feet to the left with the ground surface roughly 1.5 feet below the top of the wall or 10 feet above the spillway crest.

At the right abutment the training wall is 12.9 feet above the spillway. A parking area extends from the training wall for approximately 150 feet to the right.

The ground surface is about 4 feet below the top of the wall. On the downstream side of the parking area there is a road that is about 11 feet above the spillway crest level. Just across the road is a factory building which abuts Stony Brook on one side and the Souhegan River on another.

About 60 feet downstream from the dam Stony Brook is crossed by an arch bridge. The opening is 50 feet wide and extends 19 feet above the stream bed at its highest point. About 100 feet further downstream Stony Brook joins the Souhegan River. The Souhegan enters from the right and then makes a 90 degree bend and continues in the direction of Stony Brook.

The Souhegan River in Wilton is confined to about a 20 foot wide channel at low stages but increases at higher stages to a 100 foot or more wide channel bounded by commercial buildings and a steep bank on the left and by a railroad embankment on the right. The first floor of some of the commercial buildings is estimated to be 14 feet above the stream bed, with foundation walls extending 7 to 10 feet below that level. Approximately 600 feet downstream of the dam the Souhegan River is crossed by a railroad bridge with two openings each approximately 50 feet wide and 22 feet high. Further downstream is the Hillsborough Mills Dam which is the focus of another study.

(e) Test Flood Analysis

The hydrologic conditions of interest in this Phase I investigation are those required to assess the dam's overtopping potential and its ability to safely allow an appropriately large flood to pass. This requires using the discharge and storage characteristics of the structure to evaluate the impact of an appropriately sized Test Flood. None of the original hydraulic and hydrologic design records are available for use in this study.

Guidelines for establishing a recommended Test Flood based on the size and hazard classifications of a dam are specified in the "Recommended Guidelines" of the Corps of Engineers. The impoundment of 75 acre-feet and height of 23 feet classify the dam as a SMALL structure.

The hazard potential classification for the dam is considered to fall in the LOW category. This is because the dam failure outflow will not affect structures downstream unless the Souhegan River is concurrently at flood stage. At high stages, a dam failure will add about a 0.5 foot increment to the flood level.

As shown in Table 3 of the Corps' of Engineers "Recommended Guidelines," the appropriate Test Flood for a dam classified as SMALL in size with LOW hazard potential would be between the 50-year flood and the 100-year flood. Where a range of values is indicated for the Test Flood, the magnitude of the flood should be related to the hazard potential. Since the hazard potential is on the high side of the LOW category, the Test Flood selected is the 100-year flood.

The previous ANCO FIS provides estimated values for the 10, 50, 100 and 500-year discharges at the dam. These were computed by the Soil Conservation Service (SCS) using the convex routing method and considered the storage effects of flood control dams built in this watershed by the SCS. The computed 100-year flow rate of 5,700 cfs is adopted as the applicable Test Flood. The surcharge storage volume for this dam is not significant enough to affect the peak discharge rate.

A stage-discharge curve is developed by defining discharge as the sum of flow over the spillway, side walls, flood plains, and side slopes at the ends of the dam. The calculations determining this curve are documented in Appendix D.

The test discharge of 5,700 cfs would result in a maximum stage of 9.8 feet above the spillway crest or 0.2 feet below the roadway and ground surface at the left abutment. A low lying parking area upstream of the dam on the right side would be inundated to a maximum depth of less than one foot by the Test Flood. However, the ground rises and there would be no flow over the right abutment. The results of the hydrologic and hydraulic calculations indicate that the test flows would be 0.2 feet below the ground level at the left abutment. The spillway can pass a flow of 5,880 cfs before the ground at the left abutment would be overtopped. This compares with the Test Flood flow of 5,700 cfs.

(f) Dam Failure Analysis

The peak flow at Abbott Dam that would result from a dam failure is estimated using the procedure suggested in the Corps' of Engineers April 1978 "Rule of Thumb Guidelines for Estimating Downstream Dam Failure Hydrographs." Failure is assumed to occur at the time the ground surface at the left abutment is just overtopped at an elevation of 358.9 feet. Based on the rating curve, the spillway discharge would be 5,880 cfs for this elevation. Assuming a 20 foot gap is opened in the dam, the peak failure outflow through the gap and over the remainder of the spillway would be 7,080 cfs.

At the arched bridge 60 feet downstream of the dam, it is estimated that the dam failure outflow of 7,080 cfs would result in a flow depth just upstream of the bridge of 15.5 feet. As this is considerably less than the height of the opening (19 feet), the bridge should not be threatened. There are no structures between the dam and the bridge.

In the Souhegan River the 7,080 cfs discharge from Stony Brook would not be sufficient, in itself, to cause damaging flooding. If this flow were coincident with a high stage of the Souhegan River, some flood damage might be experienced in town. The additional component of flow due to a dam failure is only 1,280 cfs and would result in an increase of flood levels of only 0.5 feet.

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

(a) Visual Observations

The field investigation revealed no significant displacement or distress that would warrant the preparation of structural stability calculations, based on assumed sectional properties and engineering factors.

(1) Left Training Walls

There has been some ravelling of the downstream stone masonry wall. The upstream training wall has some eroded joints, and some vegetation is growing out of the face of the wall.

(2) Spillway

Spalling of the spillway cap has occurred over 50% of the surface area. Several construction joints have also opened on the upstream face. Surface erosion at the downstream spillway base has occurred. Seepage was observed through the old sluice gate.

(3) Right End Wall and Training Walls

These walls are generally in good condition although some erosion has taken place in the right end wall of the spillway.

(b) Design and Construction Data

No plans or calculations of value to a stability assessment are available for this dam.

(c) Operating Records

The only record of value is that a stage of 8 feet above spillway crest elevation was observed in 1938. It is not clear that the dam is in a similar state of repair now as it was then.

(d) Post Construction Changes

The previous outlets for the dam are no longer operable. Therefore, the pond cannot be drained. The intake structure has been filled with boulders and rubble and the sluice gate is closed with no operating mechanism. The flashboards have also been removed.

(e) Seismic Stability

This dam is located in Seismic Zone No. 2 and, in accordance with recommended Phase I guidelines, does not warrant seismic analysis.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment

(a) Condition

The Abbott Memorial Trust Dam is in FAIR condition. The left downstream training wall is in poor condition.

(b) Adequacy of Information

The lack of in-depth engineering data does not permit a definitive review. Therefore, the adequacy of the dam cannot be assessed from the standpoint of reviewing design and construction data. This assessment is thus based primarily on the visual inspection, past performance, and sound engineering judgment.

(c) Urgency

The engineering studies and improvements described herein should be implemented by the owner within one year of receipt of this Phase I Inspection Report.

(d) Need for Additional Investigations

Additional investigations are required as recommended in Paragraph 7.2.

7.2 Recommendations

It is recommended that a registered professional engineer be retained to perform the following services:

a) Monitor the seepage in the left downstream training wall and to determine the necessity to design seals or rehabilitation of the abandoned intake structure and sluice gate structure.

b) Determine the method of draining the impoundment pool to permit chinking and monitoring of all voids in the stone masonry and to seal the interfaces of the spillway at its ends.

The owner should implement the findings of the above.

7.3 Remedial Measures

It is recommended that the owner institute the following remedial measures:

(1) Drain the impoundment pool to permit chinking and mortaring of all voids in the stone masonry and to seal the interfaces of the spillway at its ends.

(2) Repair all voids at the downstream base of the spillway and the spillway crest.

(3) Repair all deteriorated concrete at the dam.

(4) Repair the rail fences on the right bank.

(5) Remove vegetation from the face of the upstream training walls.

(6) Institute a program of annual technical inspections.

7.4 Alternatives

One possible alternative to the above recommendations would be to breach the dam.

APPENDIX A

VISUAL INSPECTION CHECKLIST

INSPECTION TEAM ORGANIZATION

Date: November 1, 1978

NH 00260
ABBOTT MEMORIAL TRUST DAM
Wilton, New Hampshire
Stoney Brook
NHWRB No. 254.05

Weather: Clear, 55° F ±

INSPECTION TEAM

Nicholas A. Campagna	Goldberg, Zoino, Dunnicliff & Associates (GZD)	Team Captain
Robert Minutoli	GZD	Soils
Andrew Christo	Andrew Christo Engineers, Inc. (ACE)	Structural
Paul Razgha	ACE	Concrete
Guillermo Vicens*	Resource Analysis, Inc.	Hydrology

*Mr. Vicens inspected the site on November 8, 1978

CHECK LISTS FOR VISUAL INSPECTION

AREA EVALUATED	BY	CONDITION & REMARKS
DAM SUPERSTRUCTURE		
1. General		
Vertical alignment and movement	AC	No deficiencies noted
Horizontal alignment and movement		No deficiencies noted
3. Left Training Walls		
Stone masonry - spillway to bridge		Base of wall ravelled 5' long, 2' high and 18" deep. Chinking stones displaced at base. Masonry joints, bedrock up to 2' high void of mortar. Seepage at the rate of 15 to 30 gpm flowing through base of wall. Seepage flowing at the rate of 2 to 4 gpm through vertical joint of wall and bridge spandrel wall. Minor joint erosion above normal water level
Stone masonry - upstream splayed wall to spillway		Masonry joints, bedrock up to 5' high eroded and void of mortar
Vegetation		Three inch sapling and other vegetation rooted in joints
Stone masonry - splayed wall to bank		No deficiencies noted
5. Right Training Walls and Abutment Structure		
Stone masonry - spillway to bridge		Minor joint erosion
Vegetation	AC	Flourishing on bench

CHECK LISTS FOR VISUAL INSPECTION

AREA EVALUATED	BY	CONDITION & REMARKS
Pipe rail fence	AC	Missing post and rail sections
Return Wall - Spillway to Right Training Wall		
Concrete wall between end of spillway and intake structure		Eroded 2" deep, 3' high
Pipe rail fence		No deficiencies noted
Upstream Training Walls		
Stone masonry		No deficiencies noted
Pipe rail fence		Missing rail sections
Stone steps		No deficiencies noted
Slope paving		No deficiencies noted
Condition of concrete capping		No deficiencies noted
Intake and Tailrace Structure		
Condition of gate		Unknown. Outlet sealed
Operating equipment		Removed
Condition of concrete		No deficiencies noted
Condition of tailrace		Tailrace structure partially demolished and sealed upstream of bridge structure. Exposed cemented squared stone masonry in good condition
Seepage	AC	At the rate of 0.1 gpm or less at outlet

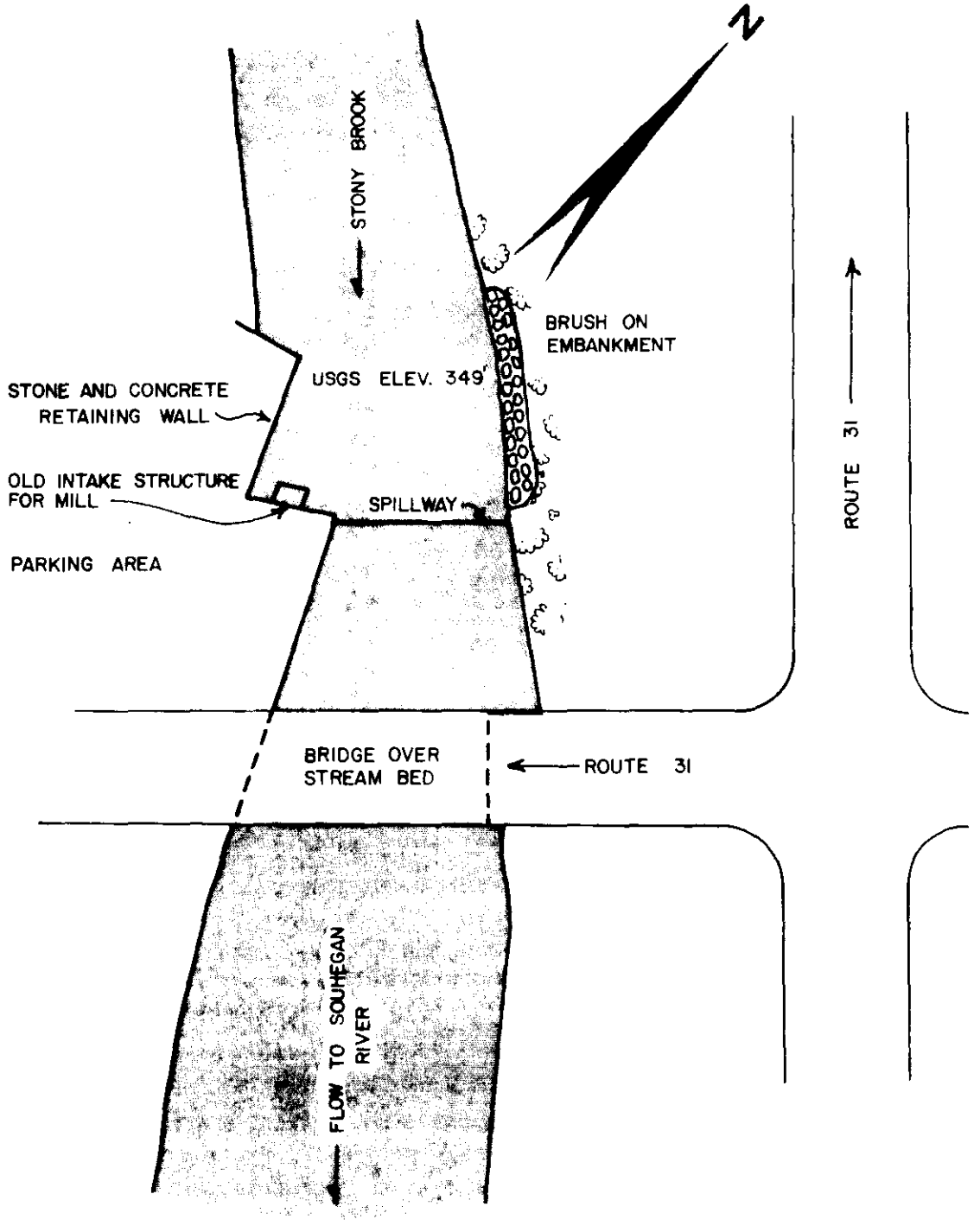
CHECK LISTS FOR VISUAL INSPECTION

AREA EVALUATED	BY	CONDITION & REMARKS
OUTLET WORKS		
Spillway		
Condition of concrete	PK	Poor
Spalling		See erosion
Erosion		Top surface of crest eroded over 50% of surface area up to 4" deep. Downstream base eroded at various locations: right side of right tunnel eroded 1.0' high, 2.5' long and 1.0' deep. Erosion under boulder adjacent to tunnel 2' deep. Erosion between second and third tunnel 3' long, 3" high and 4" deep. Minor between third and fourth tunnel. Adjacent to the left training wall 8" x 8" x 8" deep and section 10' long, 8" high and 3" deep.
Cracking		Three full length longitudinal const. joints opened approx. 1" on upstream face
Rusting or staining of concrete		None noted
Visible reinforcing		Over all downstream rectangular openings
Efflorescence		None noted
Seepage	PK	At interface with both training walls. Seepage at the rate of 10 to 20 gpm flowing out of 3.3' x 4' tunnel outlet. Extremely minor seepage (rate extremely low) emanating from 6 pressure relief vents

CHECK LISTS FOR VISUAL INSPECTION

AREA EVALUATED	BY	CONDITION & REMARKS
Flashboard stanchion supports	PR	None serviceable
RESERVOIR		
A. Shoreline		
Evidence of slides	NAC	None noted
Potential for slides		Shoreline stable
B. Sedimentation		Silt and leaves collecting behind spillway
C. Upstream hazards in the event of back flooding		One small mill about 2,000 ft. upstream on the banks
D. Changes in nature of watershed		None noted
DOWNSTREAM CHANNEL		
A. Channel Bottom		Rocky with bedrock exposed over a major portion
B. Debris		None noted
C. Trees Overhanging Channel		None noted
OPERATION AND MAINTENANCE FEATURES		
A. Reservoir Regulation Plan		None exists
B. Maintenance		
Quality		Many maintenance repairs needed
Adequacy	NAC	Situation indicates a more rigorous program needed

APPENDIX B



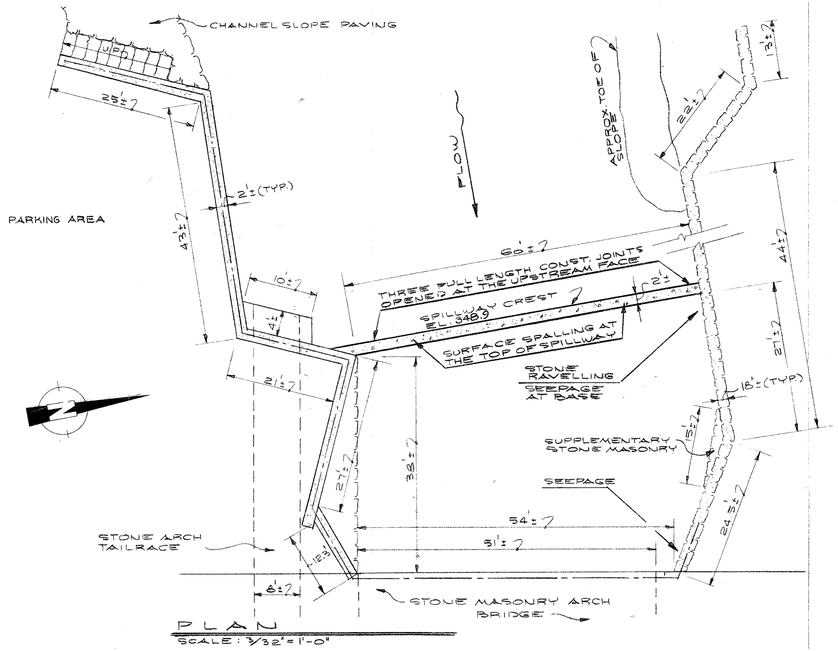
GOLDBERG, ZOINO, DUNNICLIFF & ASSOC., INC. GEOTECHNICAL CONSULTANTS NEWTON UPPER FALLS, MASS.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

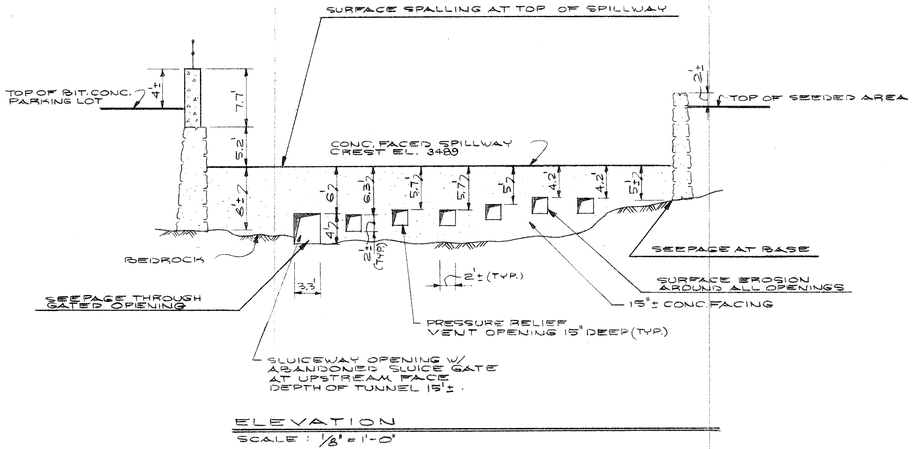
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

SITE PLAN

ABBOTT MEMORIAL TRUST DAM — NEW HAMPSHIRE

SCALE	1" = 50'
DATE	NOVEMBER 1978





NOTES

1. DAM INSPECTED ON NOVEMBER 1, 1978 BY GOLDBERG, ZOINO, DUNNICLIFF AND ASSOC., INC.

GOLDBERG, ZOINO, DUNNICLIFF & ASSOC. INC. GEOTECHNICAL CONSULTANTS NEWTON UPPER FALLS, MASS.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

FIGURE 2

PLAN AND ELEVATION

ABBOTT MEMORIAL TRUST DAM — NEW HAMPSHIRE

SCALE 1/8"=1'

DATE NOVEMBER 1978

The New Hampshire Water Resources Board (NHWRB) located at 37 Pleasant Street, Concord, N.H. 03301 maintains a correspondence file for this dam. Included in this file are:

1) Inspection reports from June 6, 1940; July 11, 1951; and July 25, 1975.

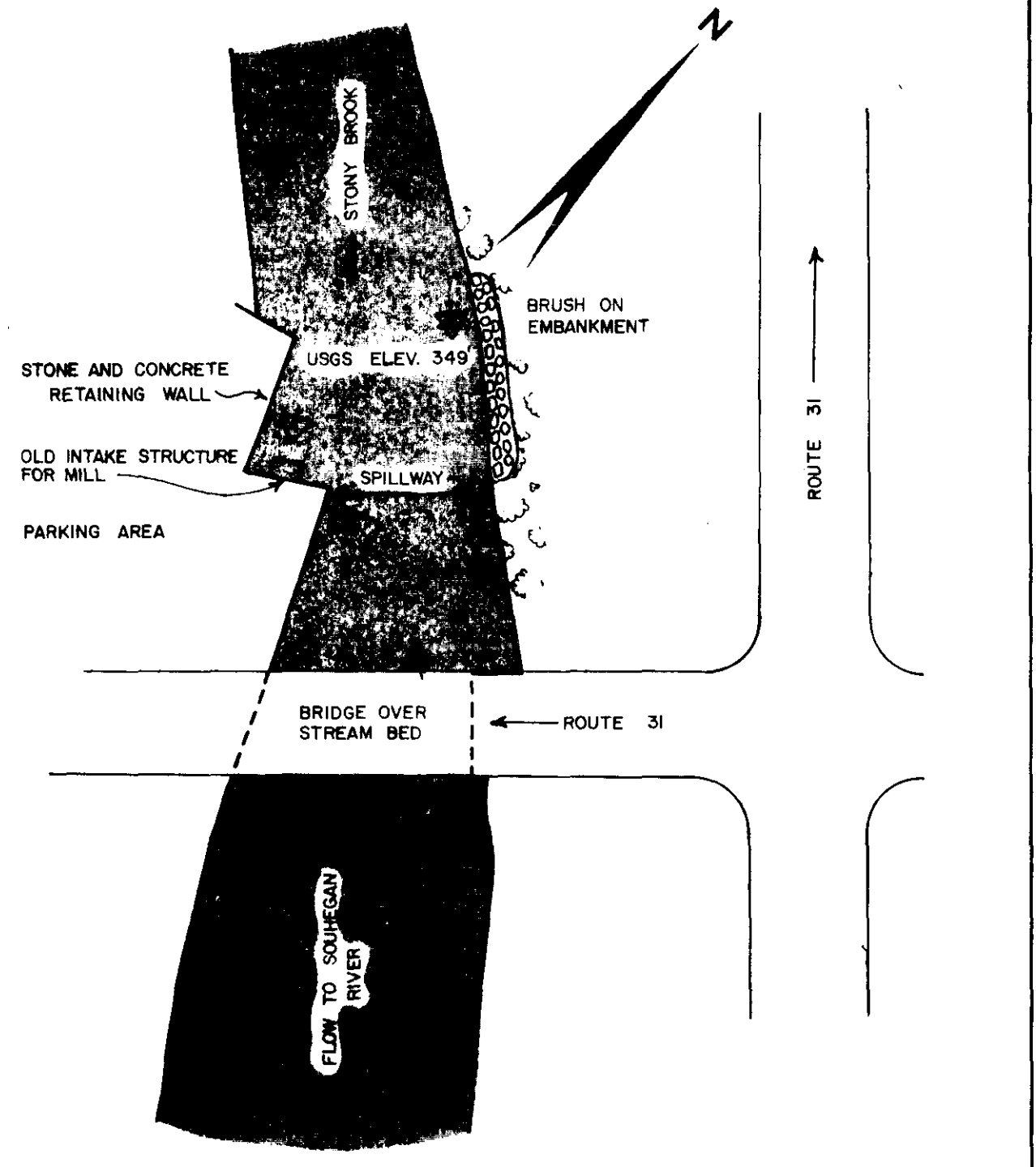
2) New Hampshire Water Control Commissions' "Data on Dams in New Hampshire" (September 26, 1939) and "Data on Water Power Developments in New Hampshire" (September 26, 1939).

3) NHWRB's "Inventory of Dams and Water Power Developments" (August 26, 1936) and "Survey of Existing New Hampshire Dams" (August 10, 1937).

4) Public Service Commission's of New Hampshire "Dam Record" (September 3, 1936).

APPENDIX C

SELECTED PHOTOGRAPHS



OVERVIEW

APPENDIX C

GOLDBERG, ZOINO, DUNNICLIFF & ASSOC., INC. GEOTECHNICAL CONSULTANTS NEWTON UPPER FALLS, MASS.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION AND ORIENTATION OF PHOTOS

FILE No. 2201

ABBOTT MEMORIAL TRUST DAM — NEW HAMPSHIRE

SCALE 1" = 50'

DATE NOVEMBER 1978

1. View from right side of road bridge showing bedrock outcrops at left abutment

2. Detail of above showing seepage at junction with training wall and metal pins in bedrock to prevent displacement of base of training wall

3. View from left abutment showing right upstream training wall around site of old mill building

4. View from upstream of old sluiceway at right abutment which has been sealed with boulders

5. View of spillway from upstream showing horizontal cracks and soil deposition behind dam

6. View from left side downstream showing typical deterioration of spillway face, old sluiceway (larger opening), and pressure relief drains (smaller openings)

APPENDIX D

HYDROLOGIC/HYDRAULIC COMPUTATIONS

I Dam Rating Curve

See page 2 for a schematic sketch of the Abbott Dam overflow section. This is based on FIS survey data, the NHWRB Survey of Existing N.H. Dams, and recent inspection at the site. The extent of overbank flood plain to the right of the dam is shown reduced somewhat because outflow is restricted by a factory building just d/s. The overbank flow rates are estimated using the weir equation. However, these flows may not be returned immediately to the stream.

The elev. shown for the right overbank is that of the roadway just d/s of the dam.

Spillway Overflow

$$Q_1 = C L H^{3/2}$$

$C = 3.1$ (weir coefficient)

$L = 60'$

H = head on crest

$$Q_1 = 3.1 \times 60 \times H^{3/2}$$

Left Overbank

$$Q_2 = 2.8 \times 58 \times (H-10)^{3/2}$$

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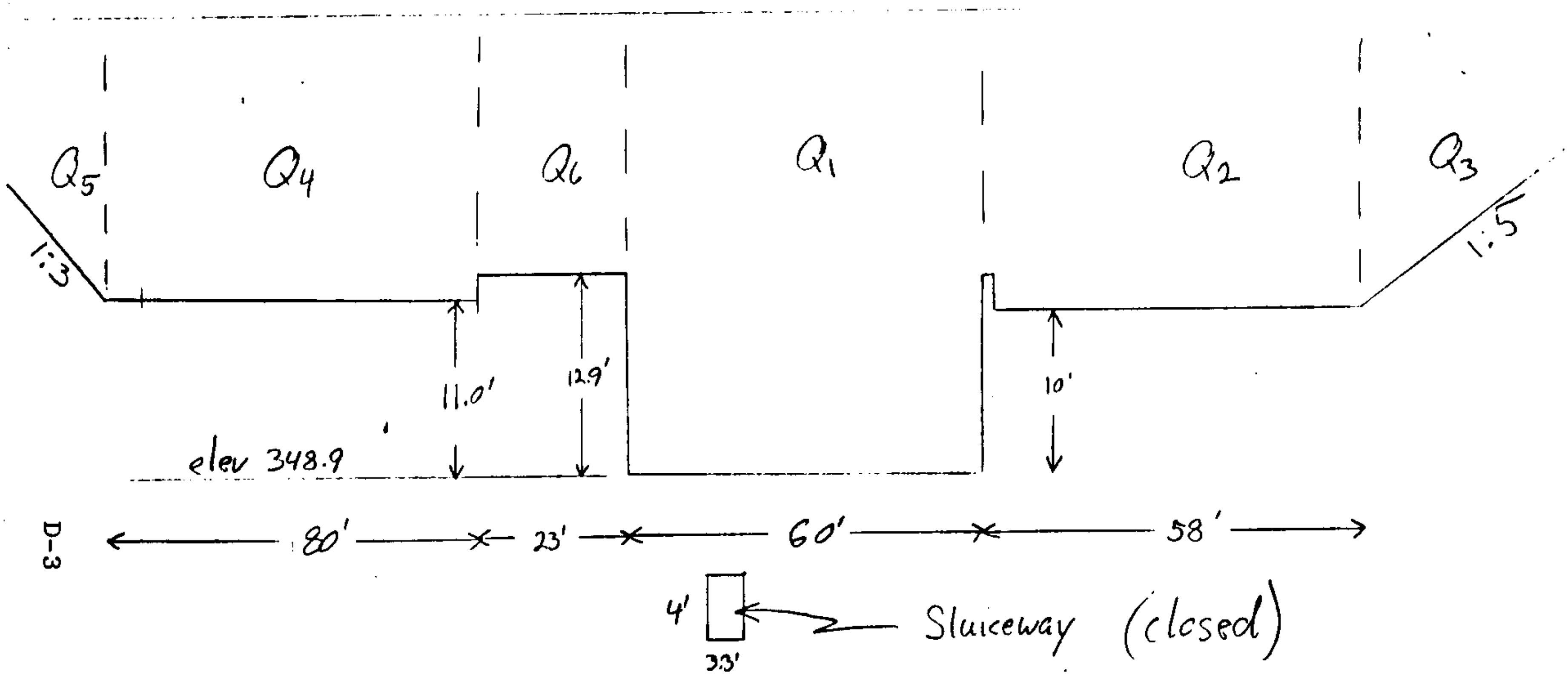


D-3

Schematic Over-flow Section (looking u/s)

Abbott Dam

Left Sideslope

$$Q_3 = 2.8 \times 5 \times (H-10) \times (.5(H-10))^{3/2}$$

Right Overbank

$$Q_4 = 2.8 \times 80 \times (H-11)^{3/2}$$

Right Sideslope

$$Q_5 = 2.8 \times 3 \times (H-11) \times (.5(H-11))^{3/2}$$

Training Wall Overflow

$$Q_6 = 3.0 \times 23 \times (H-12.9)^{3/2}$$

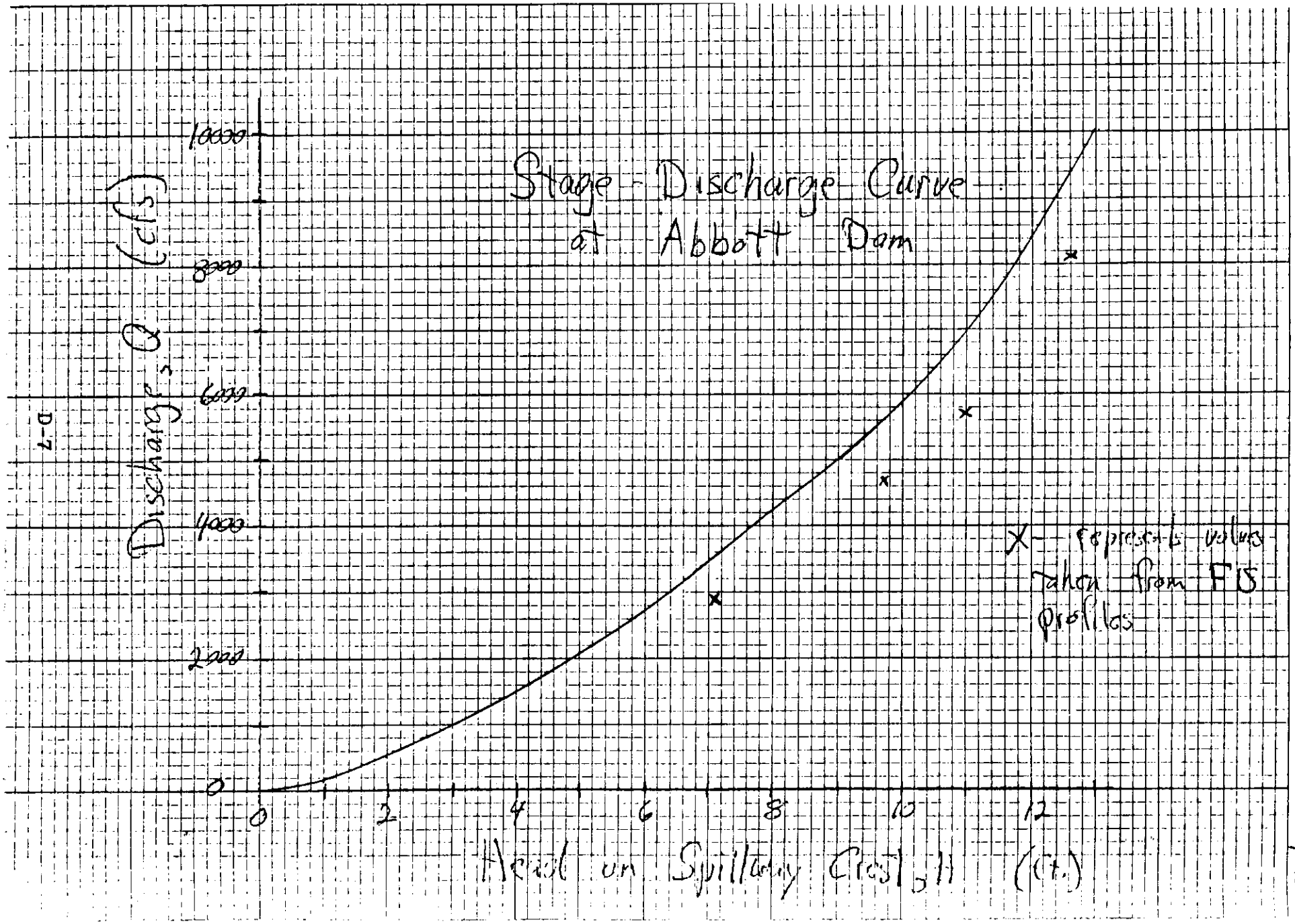
The sluiceway is assumed closed

A simple BASIC program was written to calculate an aggregate stage-discharge function at the dam. A listing is shown on page 4, followed by tabulated output and a plotted curve.

The discrepancy between these results and values taken from FIS profiles is explained by the fact that the FIS survey shows the spillway crest to be 50' long, while a recent measurement by Andrew Christo Engineers indicates a length of 60'. The latter figure has been adopted here

```
LIST
100 REMARK: STORED ON TAPE 18, FILE 53
110 REMARK: STAGE-DISCHARGE FUNCTION FOR WHITINGS DAM
120 PAGE
130 PRINT "DISCHARGE FROM WHITINGS DAM"
140 PRINT USING 150:
150 IMAGE /2T"HEAD"30T"DISCHARGE"
160 PRINT USING 170:
170 IMAGE 1T"(FEET)"32T"(CFS)"
180 PRINT USING 190:
190 IMAGE 10T"TOTAL              SPILLWAY    OVERBANK    SIDE SLOPES"
200 FOR H=0 TO 13 STEP 0.5
210 Q1=3.1*60*H↑1.5
220 Q2=0
230 Q3=0
240 Q4=0
250 Q5=0
260 Q6=0
300 IF H<=10 THEN 350
310 Q2=2.8*58*(H-10)↑1.5
320 Q3=2.8*5*(H-10)*(0.5*(H-10))↑1.5
321 IF H<=11 THEN 350
322 Q4=2.8*80*(H-11)↑1.5
323 Q5=2.8*3*(H-11)*(0.5*(H-11))↑1.5
330 IF H<=12.9 THEN 350
340 Q6=3*23*(H-12.9)↑1.5
350 Q7=Q2+Q4+Q6
360 Q8=Q3+Q5
370 Q9=Q7+Q8+Q1
380 PRINT USING 390:H,Q9,Q1,Q7,Q8
390 IMAGE 2T,2D.2D,9D,8X,10D,11D,13D
400 NEXT H
410 END
```

HEAD (FEET)	DISCHARGE (CFS)			
	TOTAL	SPILLWAY	OVERBANK	SIDE SLOPES
0.00	0	0	0	0
0.50	66	66	0	0
1.00	186	186	0	0
1.50	342	342	0	0
2.00	526	526	0	0
2.50	735	735	0	0
3.00	966	966	0	0
3.50	1218	1218	0	0
4.00	1488	1488	0	0
4.50	1776	1776	0	0
5.00	2080	2080	0	0
5.50	2399	2399	0	0
6.00	2734	2734	0	0
6.50	3082	3082	0	0
7.00	3445	3445	0	0
7.50	3820	3820	0	0
8.00	4209	4209	0	0
8.50	4609	4609	0	0
9.00	5022	5022	0	0
9.50	5446	5446	0	0
10.00	5882	5882	0	0
10.50	6387	6328	57	1
11.00	6953	6786	162	5
11.50	7645	7254	373	14
12.00	8446	7732	683	31
12.50	9331	8220	1053	57
13.00	10292	8718	1480	94


Stage - Discharge Curve
at Abbott Dam
Discharge, Q, cfs
10000
8000
6000
4000
2000
0
0
2
4
6
8
10
12
Head on Spillway Crest, H (ft.)
X - Represents values taken from FIS profiles
D-7

II Dam Failure Analysis

Outflow at Failure = Calculated outflow through breach + Normal Outflow under assumed preconditions to failure

Assume that failure occurs when the left overbank is overtopped at elev. 358.9

$H = 10'$

Normal Outflow

$Q_{normal} = 5800$ cfs (from Dam Rating)

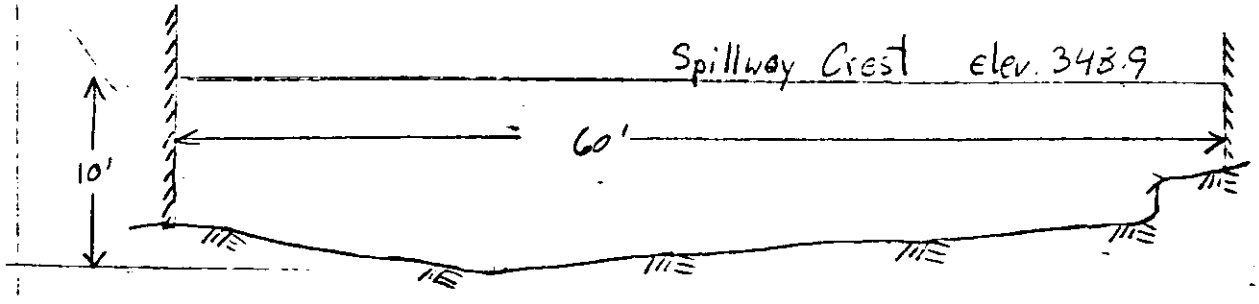
Breach Outflow

$$Q_{pi} = 8/27 \times W_b \times \sqrt{g} \times Y_o^{3/2}$$

W_b = breach width

$\leq 0.4 \times$ (width of dam at ½ height)

use $W_b = 0.4 \times 60 = 24$



Simplified Section of Dam

Y_o = depth from top of pool to tailwater at failure.

Tailwater Rating

Rather than perform a detailed backwater analysis, a tailwater rating curve has been developed using FIS results and is shown on the following page.

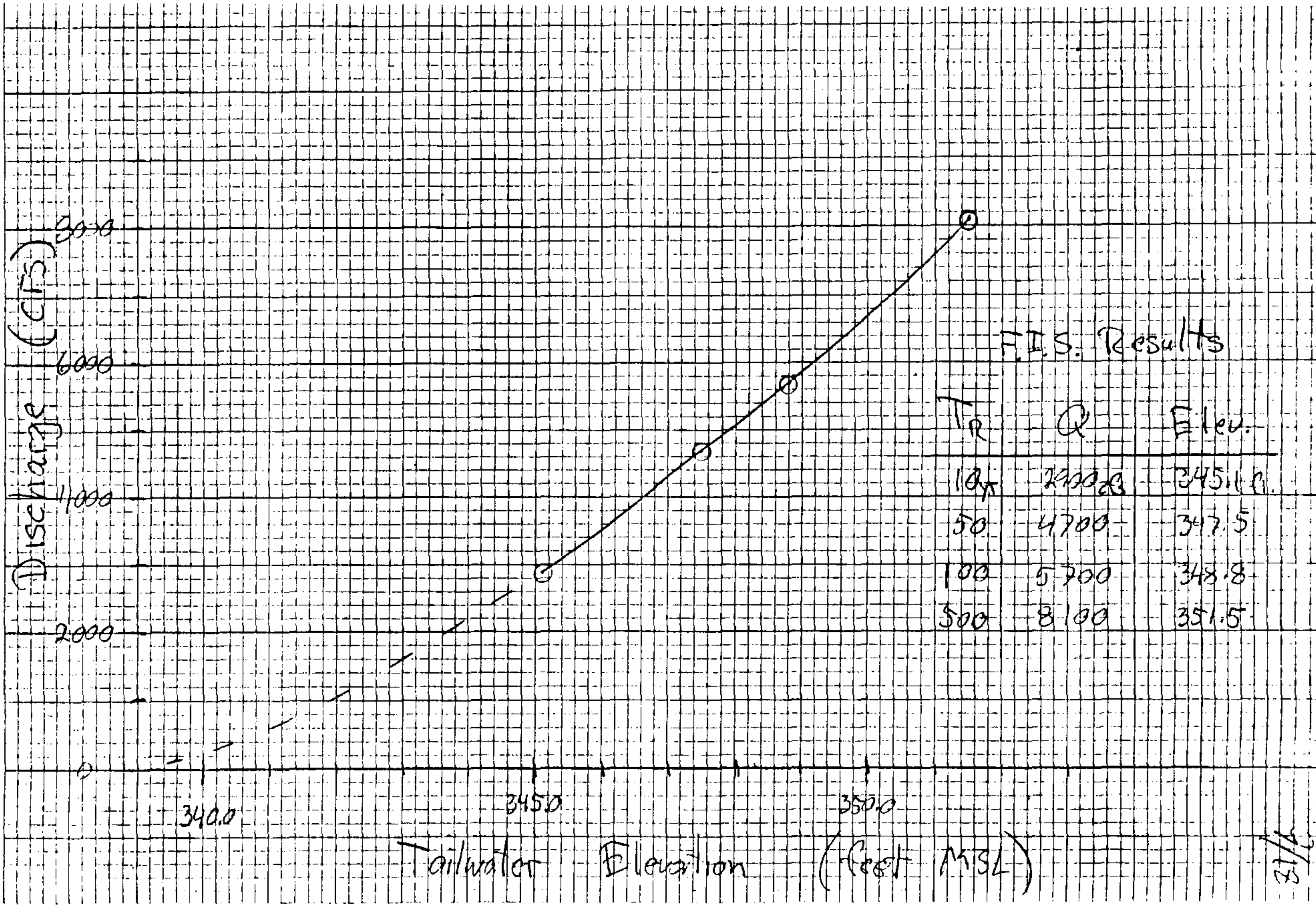
$Q = 5800$ cfs $\Rightarrow$ tailwater elev 348.9

$Y_o = 358.9 - 348.9 = 10.0$

$Q_{pl} = 8/27 \times 24 \times \sqrt{g} \times 10.0^{3/2} = 1280$ cfs

Total Outflow in River Channel

$Q = 5800 + 1280 = \underline{7080 \text{ cfs}}$

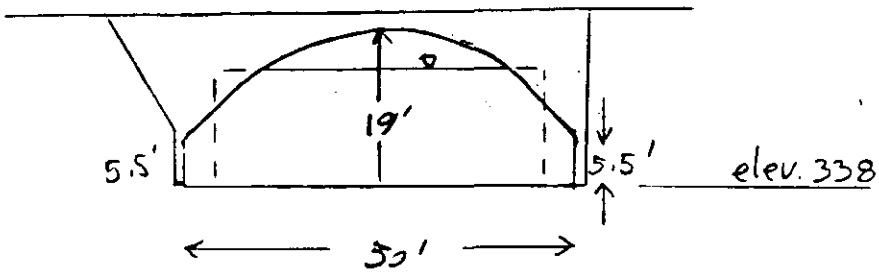


Discharge (CFS)
8000
6000
4000
2000
0
340.0
345.0
350.0
Tailwater Elevation (feet MSL)
F.I.S. Results
TR Q Elev.
50 4700 347.5
100 5700 348.8
500 8100 351.5

III Downstream Flooding

See map on following page

Highway Bridge 60' d/s



Assume bridge opening acts as an inlet control culvert after dam break and base calc. on equivilent rectangular opening

$Q = 7080$ cfs

guess $H = 15'$

$\Rightarrow B \simeq 42'$ (width of equivilent rectangle)

$$Q = \tfrac{2}{3} C_B B H \sqrt{\tfrac{2}{3} g H}$$

$C_B = 0.9$

$$Q = \tfrac{2}{3} \times 0.9 \times 42 \times 15 \sqrt{\tfrac{2}{3} g 15} = 6780 \text{ cfs}$$

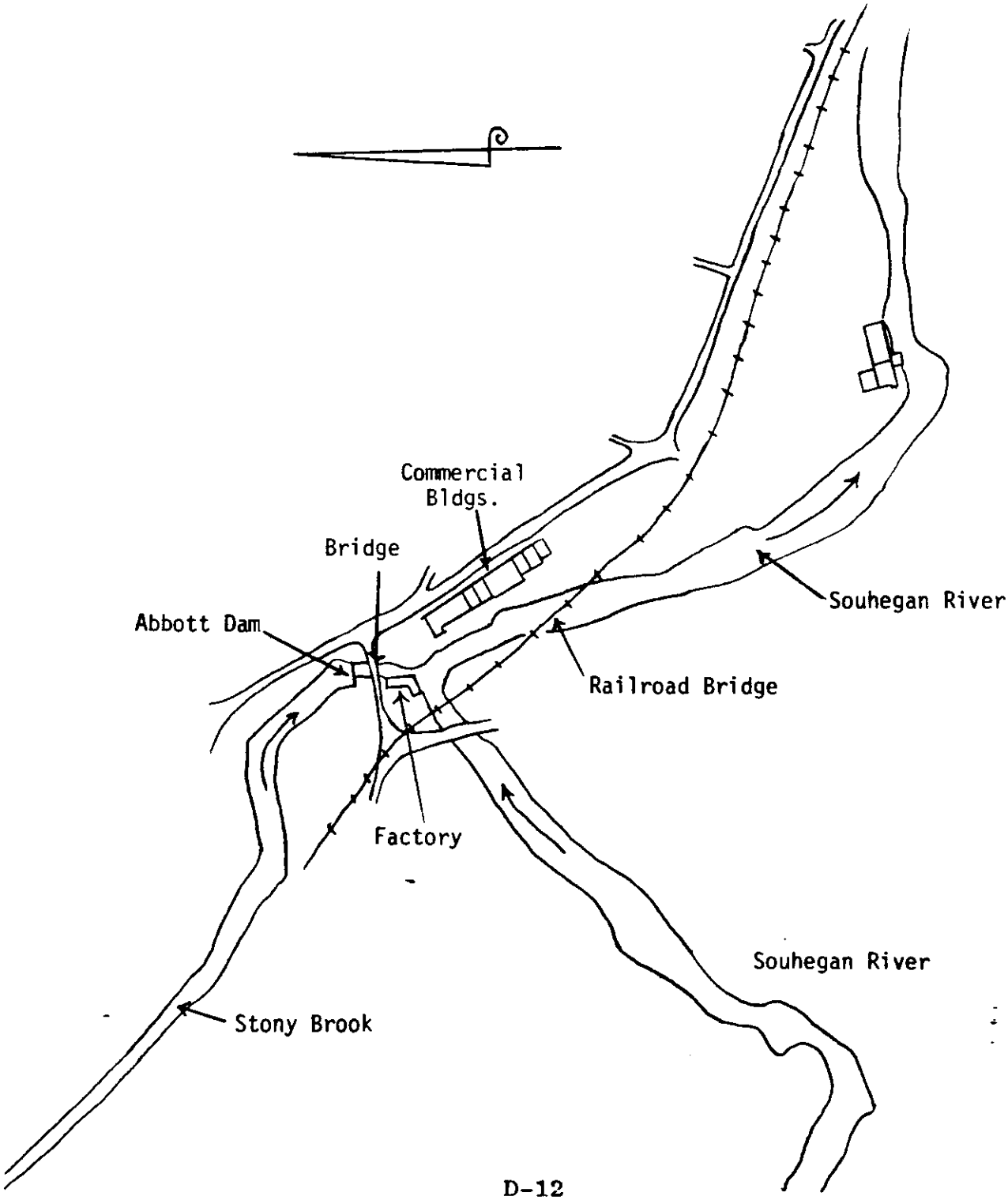
increase to $H = 15.5'$

$$Q = \tfrac{2}{3} \times 0.9 \times 42 \times 15.5 \sqrt{\tfrac{2}{3} g 15.5} = 7120 \text{ cfs}$$ OK

Flow depths will not reach top of opening

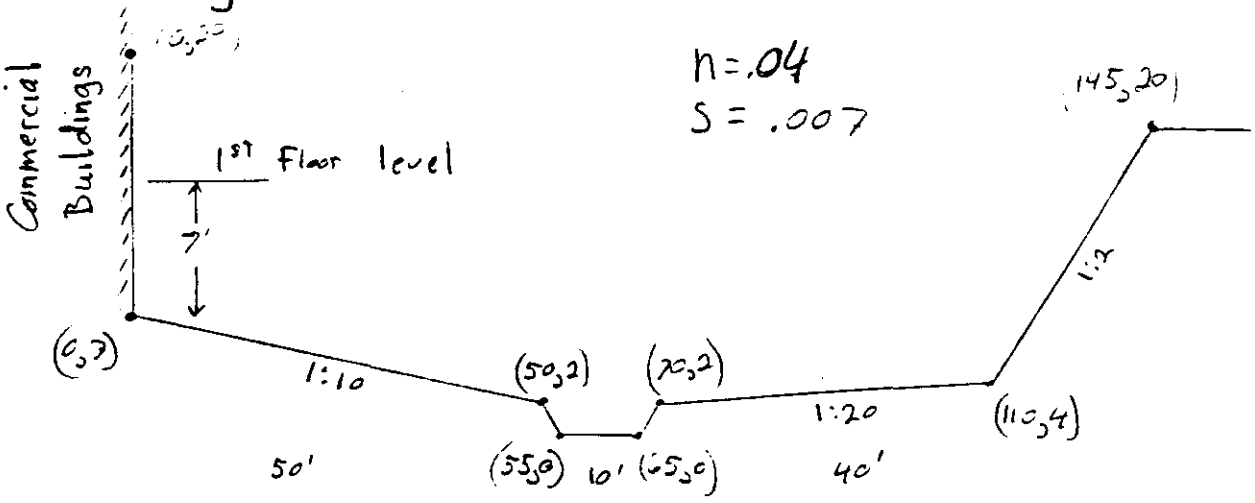
STONY BROOK AND THE SOUHEGAN RIVER IN
WILTON, N.H.

SCALE 1"=400'



165 Dam Safety Abbott Dam KBT 3/5/75 12/18.

Souhegan River in Wilton



Approx. Section of Souhegan R. just d/s of confluence w/ Stony Brook

A simple BASIC program was used to calculate a stream rating table based on the section sketched above with uniform flow. The table is shown on the following page.

The peak outflow of 7080 cfs from Stony Brook alone is not sufficient to cause damaging flooding along the Souhegan R. in Wilton. If this outflow were coincident with a high stage of the Souhegan R., flood damage might be experienced in town. Note from the rating table, however,

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	1.0	12.5	15.4	0.8	10.9	33.9
2.0	2.0	30.0	20.8	1.4	38.3	119.5
3.0	3.0	65.0	50.8	1.3	76.6	238.6
4.0	4.0	130.0	80.9	1.6	178.3	555.8
5.0	5.0	216.1	93.4	2.3	378.2	1178.6
6.0	6.0	314.4	105.8	3.0	649.9	2025.4
7.0	7.0	424.8	118.3	3.6	996.8	3106.6
8.0	8.0	542.5	121.7	4.5	1470.2	4582.0
9.0	9.0	662.3	125.1	5.3	2013.2	6274.2
10.0	10.0	784.4	128.5	6.1	2621.4	8169.7
11.0	11.0	908.6	131.9	6.9	3291.4	10257.9
12.0	12.0	1035.0	135.3	7.6	4020.7	12530.8
13.0	13.0	1163.6	138.7	8.4	4807.2	14981.9
14.0	14.0	1294.4	142.1	9.1	5649.1	17605.7
15.0	15.0	1427.3	145.5	9.8	6545.1	20398.1
16.0	16.0	1562.5	148.9	10.5	7494.0	23355.5
17.0	17.0	1699.8	152.3	11.2	8494.9	26474.9
18.0	18.0	1839.4	155.7	11.8	9547.0	29753.9
19.0	19.0	1981.1	159.1	12.4	10649.7	33190.5
20.0	20.0	2125.0	162.6	13.1	11802.5	36783.1

STREAM RATING

SOUHEGAN RIVER
D/S OF CONFLUENCE W/ STONY BROOK

that the dam breach component of 1780 cfs will cause an increase of flood levels of roughly only 0.5 feet.

IV Test Flood Analysis

Size Classification -- Small
Storage < 1000 AF
height < 40'

Hazard Classification -- Low
Flood levels d/s will increased by only about 0.5 ft. in the event of dam failure.

Test Flood Selection
Per COE guidelines, a Small dam with Low hazard potential should use a 50-yr. to 100-yr. Test Flood. As the dam is located in a developed area, choose 100-yr. flood

A 1978 FIS study by ANCO estimated 10, 50, 100, and 500 year discharges at the Abbott Dam as follows:

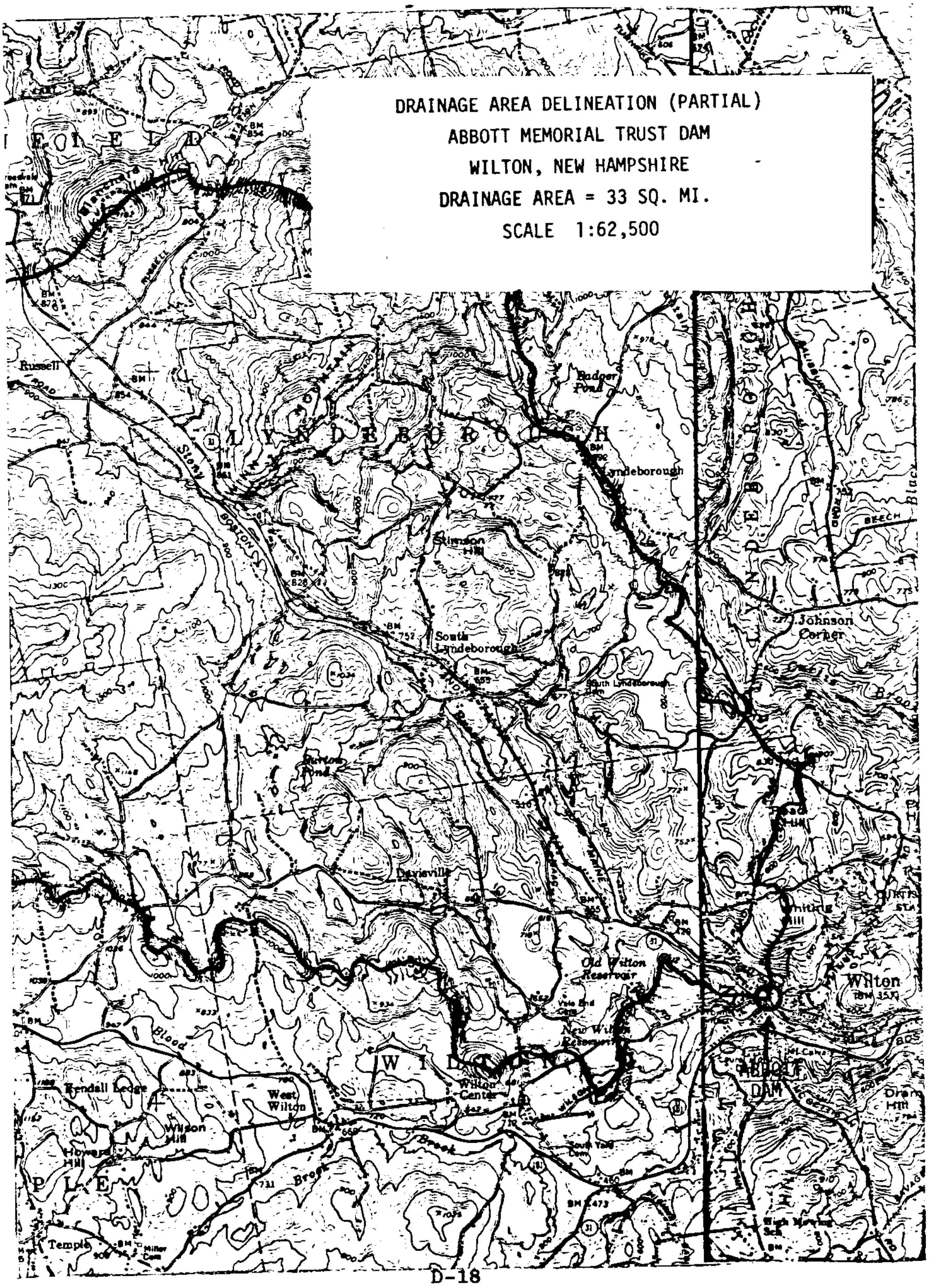
Recurrence Interval	Peak Discharge
10 yr.	2900 cfs
50	4700
→ 100	5700
500	8100

Drainage Area = 33 sq. mi

See map on following page.

Q_{100} = 5700 cfs = 5700/33 = 173 csm

The 100-yr. discharge of 5700 cfs was computed at the dam, so that storage routing in the reservoir need not be considered. In any case, the surcharge storage available is too small to have significant effect. For these reasons, a stage-storage function has not been calculated.


DRAINAGE AREA DELINEATION (PARTIAL)
ABBOTT MEMORIAL TRUST DAM
WILTON, NEW HAMPSHIRE
DRAINAGE AREA = 33 SQ. MI.
SCALE 1:62,500
Russell
Badger Pond
Lyndeborough
Stimson Hill
South Lyndeborough
Johnson Corner
Davisville
Old Wilton Reservoir
New Wilton Reservoir
Wilton
Whiting Hill
Wilton Center
West Wilton
Kendall Ledge
Wilson Hill
Howard Hill
Temple
Blood
Brook
DAM

Test Flood Summary

Size -- Small

Hazard -- Low

Test Flood -- use 100 yr. peak

Q_{100} = 5700 cfs (FIS)

Head on Spillway = 9.8' (Dam Rating)

The pool level behind the dam will be roughly 0.2' below the level of the ground surface at the left abutment.

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	INVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
[illegible]	[illegible]	[illegible]	[illegible]	011	02				ABBOTT MEMORIAL TRUST DAM	4250.7	7144.4	27	APR	79

POPULAR NAME	NAME OF IMPOUNDMENT

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	05	STONY BROOK	WILTON	0	2276

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE–FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE–FT.)	DIST	DAM	FED R	PRV/FED	SCS A	YEAR/DA
[illegible]–CT	1837	0	25	20	75	25	NED	N	N	N	N	27APR

REMARKS
21=STONE MASONRY AND CONCRETE 22=REBUILT 1906 25=NONE

DIS HAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
S	61	U	60	5300		.										

OWNER	ENGINEERING BY	CONSTRUCTION BY
ABBOTT MACHINE COMPANY		

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
[illegible] WATER RES BD	NH WATER RES BD	NH WATER RES BD	NH WATER RES BD

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
GOLDBERG ZOINO DUNNICLIFF ASSOC	01	NOV	78	PUBLIC LAW 92-367 8AUG1972

REMARKS